Collaborative Research: Supporting Agency among Early Career Engineering Education Faculty in Diverse Institutional Contexts: Developing a Framework for Faculty Agency

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As an assistant professor of engineering education at Florida International University, Dr. Alexandra Coso Strong works and teaches at the intersection of engineering education, faculty development, and complex systems design. Alexandra completed her doctorate in aerospace engineering at Georgia Tech in Spring 2014. Prior to attending Georgia Tech, Alexandra received a bachelor's degree in aerospace engineering from MIT (2007) and a master's degree in systems engineering from the University of Virginia (2010). Alexandra comes to FIU after completing a postdoctoral fellowship at Georgia Tech's Center for the Enhancement of Teaching and Learning (CETL) and three years as a faculty member at Olin College of Engineering in Massachusetts. Alexandra's research aims to improve the design of educational experiences for students by critically examining the work and learning environments of practitioners. Specifically, she focuses on (1) how to design and change educational and work systems through studies of practicing engineers and educators and (2) how to help students transition into, through and out of educational and work systems.

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Collaborative Research: Developing a Framework for Early Career Engineering Education Faculty Agency in Diverse Institutional Contexts

Introduction and Background

The continued evolution of the field of engineering education has resulted in more diversity in the backgrounds and experiences of early career faculty who take membership in the field. There have been similar changes in the types of roles these community members are occupying. These roles have changed the ways in which these new faculty can have agency as it relates to impacting engineering education locally and nationally. We define agency similarly to the definition provided by Campbell & O'Meara [1], as "taking strategic or intentional actions or perspectives towards goals that matters to oneself" (pg.52). Faculty agency serves a role in the types of outcomes and impacts faculty are able to achieve within their positions. Previous work on faculty agency highlights the need to explore faculty agency at multiple institution types, at early career stages, and within interdisciplinary fields [1]. Due to the individual differences that arise when exploring faculty agency, researchers have also suggested allowing time in the methodology to explore the interplay of the various forces and features of context that can impact faculty agency [1]. As such, this research is an investigation into the ways in which early career engineering education faculty exhibit agency within diverse institutional contexts. Our aim is to provide insight into the ways in which individuals can have new and evolving forms of impact within the field. The work performed as part of this project explores our early transition experiences, as six early career engineering education faculty, and the ways in which we are able to exercise agency as influenced by factors at the individual, institutional, field, and societal levels. Each of us contributes our lived experience from our varying position and institution types.

Project Overview

This two-phase project focuses on the study of early career engineering education faculty's agency to facilitate change within different institutional contexts. In Phase I of this project, we are exploring our own experiences as early career engineering education faculty using collaborative autoethnography [2] and collaborative inquiry [3]. The results obtained from this initial phase will then be explored more broadly in Phase II, by expanding our study population to include other early career engineering education faculty. The combination of collaborative autoethnography and collaborative inquiry methods allows us to highlight the diversity of our training, perspectives, and goals [4]. More specifically, in Phase I, we seek to generate initial responses to the following research questions:

> RQ1. What impact do early career faculty members hope to have within engineering education?
>
> RQ2. How do (a) institutional, (b) individual, and (c) disciplinary field and societal features influence early career engineering education faculty member's agency to impact engineering education in their particular positions?
>
> RQ3. How do early career faculty members perceive their impact on engineering education at their institution and more broadly?

The anticipated outcomes from Phase I include a conceptual model that illustrates the relationship between early-career faculty agency and institutional context, best practices for establishing a cross-institutional community of practice, and a methodological foundation that can be used to investigate institution-specific problems that require sensitive data collection and analysis processes.

In an effort to deeply explore our experiences and aspects connected to faculty agency, we have sought to understand the transitions into our positions and the impact we each aim to have as faculty members. These two sub-studies will be described in detail in the sections to follow.

Sub-Study 1: Faculty Transitions

The aim of sub-study 1 was to explore both our transitions into new faculty positions and the ways in which we perceived our transitions. Guided by Schlossberg's Transition Theory [5], the dynamics of support, self, and strategies were analyzed across the first two years of our roles as early career faculty. *Support* explores the different types of supports available within a situation including friends, family, colleagues, or institutional resources *Self* highlights the personal and psychological dynamics of the individual during the situation. *Strategies* are the resources used to cope within a situation. As with the rest of our project, collaborative inquiry and collaborative autoethnography approaches were used. Details of the preliminary methods and analysis, which integrated transition theory and critical incident technique [6], are detailed in Strong, et al. [7].

Preliminary results from this investigation were represented as incident timelines, outlining the critical incidents that occurred for each of us over the two year period. Each critical incident details the situation; the participants' inference of self; and any supports and strategies that were utilized. While each participant faced unique scenarios that impacted their transition, a number of commonalities were found across the group as a whole. For example, each of the participants faced a situation where they felt the need to *negotiate their legitimacy* whether it be related to their role as an engineering educator within their institution or unit, the value of the their specific area of expertise, their ability to be promoted or in a tenure position, and/or simply challenging the perspective of their administrators or their peers. Details of the results are forthcoming in a journal publication.

Sub-Study 2: Faculty Impact Study

According to Campbell and O'Meara [1], exercising faculty agency can lead to outcomes at the individual, organizational, or field and society level. In our work, we sought to understand outcomes in terms of desired impacts. Over the course of the previous year, we completed reflections on what impact we would like to achieve within our positions and the degree to which we believed we achieved this impact. We also reflected on strategic actions we took to achieve impact. In this work, we leveraged the framework developed by London [8] that defines impact on the basis of *scientific*, *contextual*, and *societal* components.

Using an emergent analysis approach, we identified impacts and strategic actions that were present across our positions and institutional contexts. We subsequently developed a quantitative survey instrument to more broadly investigate the impact and strategic actions of other early

career engineering education faculty. This also involved investigating influencers such as local and engineering education capital, which research suggests will affect whether one is able to attain their desired impacts. Inclusion of influencers was done on the basis of the Campbell & O'Meara [1] faculty agency framework. The survey instrument was iteratively developed through a process of near-peer and content expert reviews.

In October 2018, the survey instrument was distributed to early career engineering education faculty. In total, 53 responses were collected from the broader engineering education community as well as the 6 responses from the researcher team. The faculty that responded were a diverse group with regard to gender, consisting of 66.7% women, 37.3% men, 2.0% genderqueer or non-binary, and 2.0% that preferred not to answer. The majority of the faculty were White (74.6%). American Indian or Alaska Native (2.0%), East Asian (3.4%), Black or African American (15.3%), and Hispanic or Latino (6.8%) made up the rest of the population. Most survey respondents had been in their current position from 1-5 years (76%); 40 of the 59 faculty members (67.8%) were in their first professional role with 15 faculty members having transitioned into a new professional role after being in a prior role for less than 3 years (25.4%). The majority of the faculty members in the study also considered themselves to be on the tenure track or in a tenure track equivalent type of position (72.9%) with 54% of the faculty members describing their institution as an R1 or highest research activity.

Within the survey, each component of impact was broken down into several possible areas. For example, societal impacts were broken down by the ability to disseminate knowledge beyond the engineering education community, opportunity to improve education beyond their own institution, broaden participation at the national level, and influence national priorities. Although faculty members reported achieving each of these impacts, based on preliminary analysis, the most prevalent area for early career engineering education faculty was disseminating knowledge beyond the engineering education community, with the least prevalent impact being influencing national priorities.

Scientific impacts were categorized on the basis of making research contributions or influencing research practices in the engineering education community and building research capacity or contributing to the development of researchers capable of conducting engineering education research. Early career engineering education faculty members similarly achieved each of these impacts with building research capacity noted as the most frequent impact activity occurring often (more than 5 times per year) in their yearly contributions.

Finally, contextual impacts included influencing people at their institution, influencing the culture at their institution, influencing priorities at their institution, or changing practices at their institution. Faculty that responded to the survey noted that they were often (more than 5 times per year) able to influence people at their institution but were only occasionally (1-2 times per year) able to influence the priorities at their institution.

Future Work

As we move forward, we are exploring the role of identity on our experiences, our desired areas of impact, our ability to have impact, and our agency towards having an impact [9]. The results from the sub-studies, including the identity work, will be used to develop an initial model of early career engineering education researchers' agency towards impacting change. As the project enters Phase II, the perspectives of other early career engineering education researchers will be incorporated. The first step will be to interview 12 purposively-sampled faculty identified from respondents to the impact survey. Six graduate students will be integrated into the project to expose them to the engineering education community and this type of project and methodology. The graduate students will assist in the interviews as well as aspects of the interview analysis. Ultimately, this data will be used to test and challenge the model that will be developed from the results of our own experiences.

Acknowledgements

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